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| 09/816,155      | 03/26/2001  | Seiji Mizuoka        | 2001-0348A          | 9174             |

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EXAMINER

LEE, SHUN K

ART UNIT PAPER NUMBER

2878

DATE MAILED: 01/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/816,155

Applicant(s)

MIZUOKA ET AL.

Examiner

Shun Lee

Art Unit

2878

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16, 21, 24, 28, 29 and 33 is/are rejected.
- 7) ☒ Claim(s) 17-20, 22, 23, 25-27 and 30-32 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_ 6) ☐ Other:

## **DETAILED ACTION**

### ***Specification***

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Objections***

2. Claim 3 is objected to because of the following informalities: claim 3 recites the limitation "the thickness superimposed image" in lines 18-19 (the antecedent basis for this limitation is indefinite, it is suggested that "first thickness superimposed image" in claims 3 and 5 should probably be --first superimposed image-- and "second thickness superimposed image" in claims 3 and 5 should probably be --second superimposed image-- to avoid confusion with "thickness superimposed image"). Appropriate correction is required.

3. Claim 16 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 16 recites the limitation of "an image of only the first connected part obtained by the binarization by the bright side level". However, claim 15 recites the limitation of "form the image of only the second connected part by a bright side level ( $A + \alpha$ )".

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 15 and 16 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 15 recites the limitation of "the image forming device binarizes the brightness information so as to form the image of only the second connected part by a bright side level ( $A + \alpha$ )" which was not described in the specification. It should be noted that the specification discloses (Figs. 14-16) that an image (503) of only the first connected part (5011 indicates the first connected part in transmission image 501) is obtained by binarization at the bright side level ( $A + \alpha$ ).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1, 2, 6-8, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heumann (US 6,201,850) and incorporated by reference US 4,926,452 (Baker *et al.*) in view of Garland *et al.* (US 6,256,406).

In regard to claims 1 and 2, Heumann discloses a connection inspecting apparatus for inspecting connection of a connected part, which comprises:

- (a) an irradiation part (200) for applying a radiation to the connected part of members with an application condition kept invariant (*i.e.*, inherent in incident intensity  $I_0$  is an invariant application condition; column 24, lines 53-59);
- (b) a scintillator (250) for converting a radiation passed through the connected part to a visible light (column 23, lines 45-53);
- (c) an imaging device (258) for picking up transmission images of the connected part generated from the scintillator;
- (d) a sub thickness image forming device (270) for forming (column 20, lines 57-61) sub thickness images corresponding to the transmission images supplied from the imaging device on the basis of a relationship (Fig. 1A) between a brightness density of the transmission image and a thickness of the connected part.

The connection inspecting apparatus of Heumann lacks obtaining a plurality of transmission images having different storage times and that a superimposed image forming device forms a thickness superimposed image of the connected part by adding (e.g., only valid parts extracted and collected from) a plurality of the sub thickness images having different storage times to each other. Exposure compensation is well known in the art. For example, Garland *et al.* teach (column 1, line 26 to column 2, line 21) it is well known in the art that large thickness variations requires exposure compensation so as to prevent overexposure and underexposure of an x-ray image. Garland *et al.* also teach (column 6, lines 38-48) that exposure compensation can be accomplished by having different exposure time (*i.e.*, storage time) when imaging different portions an object having different thickness which would lead to either overexposure and underexposure different portions of an x-ray image and that these imaging different object portions are captured and built into a diagnostic image. Therefore it would have been obvious to one having ordinary skill in the art to form a thickness superimposed image from valid parts (*i.e.*, transmission image portions having different storage times for correct exposure of the parts) in the connection inspecting apparatus of Heumann, in order to obtain an exposure compensated thickness superimposed image as taught by Garland *et al.*

In regard to claims 7 and 8, the method steps are implicit for the modified apparatus of Heumann since the structure is the same as the applicant's apparatus of claims 1 and 2.

In regard to claims **11** and **12**, the computer program steps which are recorded in a computer readable recording medium are implicit for the modified apparatus of Heumann since the structure comprising a computer (column 24, lines 5-19) which includes memory (*i.e.*, a computer readable recording medium for recording programs) and preprogrammed inspection routines (*i.e.*, programs) to make a computer execute the x-ray imaging (see incorporated by reference US 4,926,452 column 21, line 35 to column 25, line 20) is the same as the applicant's apparatus of claims 1 and 2.

In regard to claim **6** which is dependent on claim 1, Heumann also discloses (Figs. 1A-1C) a teaching jig (4) of a known thickness which is a member for obtaining the relationship between the brightness density of the transmission image and the thickness of the connected part and is formed of a material with a radiation transmittance equal to that of the connected part (column 20, lines 45-64).

9. Claims 3-5, 9, 10, 13, 14, 21, 24, 28, 29, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heumann (US 6,201,850) and incorporated by reference US 4,926,452 (Baker *et al.*) in view of Garland *et al.* (US 6,256,406) as applied to claims 1, 7, and 11 above, and further in view of Koike *et al.* (US 5,836,504).

In regard to claims **3** and **4** (which are dependent on claim 1), claim **9** (which is dependent on claim 7), and claim **13** (which is dependent on claim 11), the apparatus and method of Heumann lacks that in addition to said thickness superimposed image (representing brightness information) of said connected part, the superimposed image forming device further forms a second thickness superimposed image by adding a plurality of second sub thickness images corresponding to each of the transmission

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images at the different storage times when a plurality of additional connected part are present in addition to said connected part overlapping in the application direction of the radiation (e.g., the second thickness superimposed image representing brightness information corresponds to said connected part at one face of a plate-shaped member and an additional connected part at the other face opposite said one face) and subtracts said thickness superimposed image from the second thickness superimposed image so as to form a third thickness superimposed image (which e.g., corresponds to said additional connected part at said other face). Koike *et al.* teach that (column 1, line 15 to column 2, line 30) it is known in the art to subtract a one-side x-ray transmission image from a both-side x-ray transmission image in order to inspect the soldering on the other-side of a two-sided circuit board. Therefore it would have been obvious to one having ordinary skill in the art to subtract a one-side x-ray transmission image (representing brightness information) from a both-side x-ray transmission image (representing brightness information) in the apparatus and method of Heumann, in order to inspect the soldering on the other-side of a two-sided circuit board.

In regard to claim **5** (which is dependent on claim 3) and claim **10** (which is dependent on claim 9), Heumann and Baker *et al.* in view of Garland *et al.* is applied as in claim 2 above.

In regard to claims **14** and **21**, Heumann and Baker *et al.* in view of Garland *et al.* and further in view of Koike *et al.* is applied as in claim 4 above.



In regard to claims **24** and **28**, the method steps are implicit for the modified apparatus of Heumann since the structure is the same as the applicant's apparatus of claims 14 and 21.

In regard to claims **29** and **33**, the computer program steps which are recorded in a computer readable recording medium are implicit for the modified apparatus of Heumann since the structure comprising a computer (column 24, lines 5-19) which includes memory (*i.e.*, a computer readable recording medium for recording programs) and preprogrammed inspection routines (*i.e.*, programs) to make a computer execute the x-ray imaging (see incorporated by reference US 4,926,452 column 21, line 35 to column 25, line 20) is the same as the applicant's apparatus of claims 14 and 21.

### ***Allowable Subject Matter***

10. Claims 17-20, 22, 23, 25-27, and 30-32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter: the instant application is deemed to be directed to a nonobvious improvement over the invention patented in US Patent 6,201,850. The improvements comprise in combination with other recited elements: (a) binarizing the brightness information so as to form the image of only the second connected part by a bright side level ( $A + \alpha$ ) brighter than a reference brightness level ( $A$ ) of the transmission image of the first connected part when the object has only the first connected part and by a dark side level ( $A - \beta$ ) darker than the reference brightness level as recited in claims 15, 16, 25,

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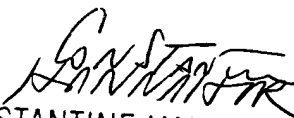
and 30; and (b) obtaining outline position information of the first connected part based on the transmission image of the first connected part, and forms the image of only the second connected part on the basis of the brightness information and the outline position information as recited in claims 17-20, 22, 23, 26, 27, 31, and 32.

### **Conclusion**

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (703) 308-4860. The examiner can normally be reached on Tuesday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (703) 308-4852. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

  
CONSTANTINE HANNAHER  
PRIMARY EXAMINER  
GROUP ART UNIT 2878

SL  
January 24, 2003